

Claims:

1. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.003 % or less of C; 0.003 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; at least one of 0.03 ~ 0.2 % of Mn and 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%,
5 Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein, when the steel sheet comprises one of Mn and Cu, a composition of Mn, Cu, and S satisfies at least one relationship: $0.58 \cdot \text{Mn}/\text{S} \leq 10$ and $1 \leq 0.5 \cdot \text{Cu}/\text{S} \leq 10$, and when the steel sheet comprises both Mn and Cu, a composition of Mn, Cu, and S satisfies the relationships: $\text{Mn} + \text{Cu} \leq 0.3$ and $2 \leq 0.5 \cdot (\text{Mn} + \text{Cu})/\text{S} \leq 20$, and wherein
10 precipitates of MnS, CuS, and (Mn, Cu)S have an average size of 0.2 μm or less.
2. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.003 % or less of C; 0.005 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.05 ~ 0.2 % of Mn; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a composition of Mn and S
15 satisfies the relationship: $0.58 \cdot \text{Mn}/\text{S} \leq 10$ in terms of weight, and wherein precipitates of MnS have an average size of 0.2 μm or less.
3. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.015 % or less of P.

4. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.004 % or less of N.

5. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.03
5 ~ 0.2 % of P.

6. The steel sheet as set forth in claim 2, further comprising at least one of 0.1
~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

7. The steel sheet as set forth in claim 2, wherein the steel sheet comprises
10 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

8. The steel sheet as set forth in claim 7, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

9. The steel sheet as set forth in any one of claims 2 to 8, further comprising 0.01 ~ 0.2 % of Mo.

15 10. The steel sheet as set forth in any one of claims 2 to 8, further comprising 0.01 ~ 0.2 % of V.

11. The steel sheet as set forth in claim 10, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

12. The steel sheet as set forth claim 9, further comprising 0.01 ~ 0.2 % of V.

13. The steel sheet as set forth in claim 12, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot V/C \leq 20$.

5 14. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.0005 ~ 0.003 % or less of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.01 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a composition of Cu and S satisfies the relationship: $1 \leq 0.5 \cdot Cu/S \leq 10$, and wherein precipitates of CuS have an
10 average size of 0.1 μm or less.

15. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.015 % or less of P.

16. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.004 % or less of N.

15 17. The steel sheet as set forth in claim 14, wherein the composition of Cu and S satisfies the relationship: $1 \leq 0.5 \cdot Cu/S \leq 3$.

18. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.03 ~ 0.2 % or less of P.

19. The steel sheet as set forth in claim 14, further comprising at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

20. The steel sheet as set forth in claim 14, wherein the steel sheet comprises
5 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

21. The steel sheet as set forth in claim 20, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

22. The steel sheet as set forth in any one of claims 14 to 21, further comprising 0.01 ~ 0.2 % of Mo.

10 23. The steel sheet as set forth in any one of claims 14 to 21, further comprising 0.01 ~ 0.2 % of V.

24. The steel sheet as set forth in claim 23, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

25. The steel sheet as set forth claim 22, further comprising 0.01 ~ 0.2 % of V.

15 26. The steel sheet as set forth in claim 25, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

27. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.0005 ~ 0.003 % or less of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.03 ~ 0.2 % of Mn; 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a
5 composition of Mn, Cu, and S satisfies the relationship: $Mn+Cu \leq 0.3$ and $2 \leq 0.5*(Mn+Cu)/S \leq 20$, and wherein precipitates of MnS, CuS, and (Mn, Cu)S have an average size of 0.2 μm or less.

28. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.015 % or less of P.

10 29. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.004 % or less of N.

30. The steel sheet as set forth in claim 27, wherein the number of precipitates is 2×10^6 or more.

15 31. The steel sheet as set forth in claim 27, wherein the composition of Mn, Cu and S satisfies the relationship: $2 \leq 0.5*(Mn+Cu)/S \leq 7$.

32. The steel sheet as set forth in claim 31, wherein the number of precipitates is 2×10^8 or more.

33. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.03 ~ 0.2 % or less of P.

34. The steel sheet as set forth in claim 27, further comprising at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

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35. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

36. The steel sheet as set forth in claim 35, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

10 37. The steel sheet as set forth in any one of claims 27 to 36, further comprising 0.01 ~ 0.2 % of Mo.

38. The steel sheet as set forth in any one of claims 27 to 36, further comprising 0.01 ~ 0.2 % of V.

15 39. The steel sheet as set forth in claim 38, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

40. The steel sheet as set forth claim 39, further comprising 0.01 ~ 0.2 % of V.

41. The steel sheet as set forth in claim 37, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot V/C \leq 20$.

42. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab
5 with finish rolling at an Ar_3 transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more, the steel slab comprising 0.003 % or less of C; 0.005 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.05 ~ 0.2 % of Mn; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Mn and S
10 satisfies the relationship: $0.58 \cdot Mn/S \leq 10$; cooling the steel sheet at a speed of 200 °C/min or more; coiling the cooled steel sheet at a temperature of 700 °C or less; cold rolling the steel sheet; and continuous annealing the cold rolled steel sheet.

43. The method as set forth in claim 42, wherein the steel slab comprises
15 0.015 % or less of P.

44. The method as set forth in claim 42, wherein the steel slab comprises 0.004 % or less of N.

45. The method as set forth in claim 42, wherein the steel slab comprises 0.03 ~ 0.2 % of P.

46. The method as set forth in claim 42, wherein the steel slab further comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

47. The method as set forth in claim 42, wherein the steel slab comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

5 48. The method as set forth in claim 47, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

49. The method as set forth in any one of claims 42 to 48, wherein the steel slab further comprises 0.01 ~ 0.2 % of Mo.

10 50. The method as set forth in any one of claims 42 to 48, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

51. The method as set forth in claim 50, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

15 52. The method as set forth claim 49, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

53. The method as set forth in claim 52, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

54. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab with finish rolling at an Ar3 transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more, the steel slab comprising 0.0005 ~ 0.003 % of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.01 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Cu and S satisfies the relationship: $1 \leq 0.5 \cdot \text{Cu}/\text{S} \leq 10$; cooling the steel sheet at a speed of 300 °C/min; coiling the cooled steel sheet at a temperature of 700 °C or less; cold rolling the wound steel sheet; and continuous annealing the cold rolled steel sheet.

55. The method as set forth in claim 54, wherein the steel slab comprises 0.015 % or less of P.

56. The method as set forth in claim 54, wherein the steel slab comprises 0.004 % or less of N.

57. The method as set forth in claim 54, wherein the composition of Cu and S satisfies the relationship: $1 \leq 0.5 \cdot \text{Cu}/\text{S} \leq 3$.

58. The method as set forth in claim 54, wherein the steel slab comprises 0.03 ~ 0.2 % or less of P.

59. The method as set forth in claim 54, wherein the steel slab further comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

60. The method as set forth in claim 54, wherein the steel slab comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

5 61. The method as set forth in claim 60, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

62. The method as set forth in any one of claims 54 to 61, wherein the steel slab further comprises 0.01 ~ 0.2 % of Mo.

10 63. The method as set forth in any one of claims 54 to 61, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

64. The method as set forth in claim 63, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

15 65. The method as set forth claim 62, further comprising 0.01 ~ 0.2 % of V.

66. The method as set forth in claim 65, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

67. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab with finish rolling at an Ar3 transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more, the steel slab comprising: 0.0005 ~ 0.003 % of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.03 ~ 0.2 % of Mn; 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Mn, Cu, and S satisfies the relationships: $Mn+Cu \leq 0.3$ and $2 \leq 0.5*(Mn+Cu)/S \leq 20$; cooling the steel sheet at a speed of 300 °C/min; coiling the cooled steel sheet at a temperature of 700 °C or less; cold rolling the wound steel sheet; and continuous annealing the cold rolled steel sheet.

68. The method as set forth in claim 67, wherein the steel slab comprises 0.015 % or less of P.

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69. The method as set forth in claim 67, wherein the steel slab comprises 0.004 % or less of N.

70. The method as set forth in claim 67, wherein the number of precipitates is 2×10^6 or more.

71. The method as set forth in claim 67, wherein the composition of Mn, Cu and S satisfies the relationship: $2 \leq 0.5*(Mn+Cu)/S \leq 7$.

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72. The method as set forth in claim 71, wherein the number of precipitates is 2×10^8 or more.

73. The method as set forth in claim 67, wherein the steel slab comprises 0.03
5 ~ 0.2 % or less of P.

74. The method as set forth in claim 67, wherein the steel slab further comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

75. The method as set forth in claim 67, wherein the steel slab comprises 0.005
~ 0.02 % of N and 0.03 ~ 0.06 % of P.

10 76. The method as set forth in claim 75, wherein the composition of Al and N satisfies the relationship: $1 \leq 0.52 \cdot \text{Al}/\text{N} \leq 5$.

77. The method as set forth in any one of claims 67 to 76, wherein the steel slab further comprises 0.01 ~ 0.2 % of Mo.

15 78. The method as set forth in any one of claims 67 to 76, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

79. The method as set forth in claim 78, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot \text{V}/\text{C} \leq 20$.

80. The method as set forth claim 77, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

81. The method as set forth in claim 80, wherein the composition of V and C satisfies the relationship: $1 \leq 0.25 \cdot V/C \leq 20$.